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The G(e)nomes of Zurich: Civil Society Calls for Urgent Controls on Synthetic Life

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Scientists and industrialists in the controversial new field of synthetic biology (building life-forms from scratch) are meeting in Zurich, Switzerland this week amidst claims that the world's first entirely human-made organism may be only weeks away from creation. Swiss and international civil society groups are calling for swift action to control this technology but the scientists themselves are advancing pre-emptive proposals to evade regulation. As scientists meet in Zurich, the UK's Royal Society and the Swiss government announce plans to investigate synthetic biology.

Synthetic Biology 3.0

An international scientific congress, Synthetic Biology 3.0, is meeting in Zurich from 24-27 June to discuss the latest advances in Synthetic Biology – the new field of extreme genetic engineering that attempts to build synthetic life forms. Synthetic biologists contend that all the parts of life can be made synthetically (that is, by chemistry) and then engineered together in the laboratory to produce “living machines” – fully working organisms programmed for particular tasks. Some are being designed for intentional environmental release. Today there are about a dozen synthetic biology companies worldwide plus almost 70 commercial ‘gene foundries’ that manufacture designer DNA molecules for industrial use. The first commercial products using synthetic biology (e.g., a textile fiber by DuPont) are about to enter the market and there are concerns that dangerous pathogens, such as smallpox or Ebola virus, could now be constructed as bioweapons. Because synthetic biology goes far beyond the genetic engineering techniques previously used to develop genetically modified food and drugs, no laws have yet been developed that address its safety, security and societal risks.

“Once more a new technology is storming ahead with no government or international body able to regulate or control it,” says biologist Florianne Koechlin from SAG (the Swiss Working Group on Gene Technology). “Once more we hear from the scientific community, supported by industry and the military, that they have life under control and will soon be able to construct it. But life is more than the sum of its parts.” Koechlin is a member of the Swiss government-appointed ethics body that will investigate the implications of synthetic biology later this year.

Synthetic Biology 3.Ownership?

The task of framing new laws became more urgent earlier this month when ETC Group, an international civil society organisation, uncovered the first-ever patent application on a

fully synthetic life form produced via synthetic biology. US patent application no. 20070122826, entitled “Minimal bacterial genome,” claims monopoly ownership of a “free-living organism that can grow and replicate” whose genome (full genetic information) has been built entirely through mechanical means. Craig Venter, whose scientific institute filed the patent application, has since told *Business Week* that his team is only weeks or months away from having built such a synthetic organism, dubbed *Mycoplasma laboratorium* (nicknamed ‘Synthia’ by ETC Group).¹ If they succeed it will mark a break with evolution as we know it.

Craig Venter himself has a long history of mixing cutting-edge science with commercial exploitation. He led the private part of the human genome-sequencing project, selling human genetic data to pharmaceutical companies as he went. Once again he has announced that he hopes to cash in on a new science, boasting that his new synthetic creation could be the first trillion-dollar organism.² Just last week he inked an investment deal with oil company BP that brought the commercial value of his start-up company, Synthetic Genomics, Inc., to US\$300 million.³ Civil society critics are concerned that, using broad patents, Venter may carve out a monopoly position as the ‘Microbesoft’ of synthetic biology.

“In the last year synthetic biologists have really climbed into bed with big business,” explains Jim Thomas of the ETC Group. “With BP, Cargill and DuPont setting their sights on synbio, the corporate agenda is starting to drive this powerful technology. Society should be concerned about whose interests will get ignored or even trampled on.”

Synthetic biology 3.oh no here we go again...

A year ago (at Synthetic Biology 2.0 in Berkeley, California) scientists attempted to advance a plan for self-governance of the field, seen by critics as a ruse to head off future regulation. Those plans were quietly dropped after 38 civil society organisations signed an open letter calling on the scientists to abandon the scheme and pursue a wider, more inclusive dialogue with society. No such dialogue has been forthcoming. This year the same proposals have largely been repackaged, and published in the June issue of *Nature Biotechnology*.⁴ The recycled governance proposal, authored by members of a new trade body, The International Consortium for Polynucleotide Synthesis, along with scientist-entrepreneurs and employees of the US FBI (Federal Bureau of Investigation), focuses exclusively on biowarfare concerns. It presents a framework where the industry body shares best practices and screening software to identify synthetic DNA that could be of interest to bioterrorists. In addition, the authors recommend a requirement that all buyers of synthesized DNA reveal their name, home institution and offer any biosafety information relevant to the sequences they are ordering. The authors feel satisfied that this “path forward” is sufficient to top-up existing biosafety laws. Critics disagree.

“Of the proposed framework’s fourteen authors, all but four [who are FBI employees] declared competing financial interests. We believe the authors’ own investment in the success of the technology cannot help but overwhelm their capacity for self-criticism,” argues Kathy Jo Wetter of ETC Group. “It is bad enough that this new industry is already claiming exclusive ownership on artificial life forms; they should not be allowed to make up artificial governance frameworks, too.”

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FOR BACKGROUND ON SYNTHETIC BIOLOGY:

ETC Group report, *Extreme Genetic Engineering: An Introduction to Synthetic Biology*, 16 January 2007

http://www.etcgroup.org/en/materials/publications.html?pub_id=602

ETC Group news release, “Patenting Pandora’s Bug: Goodbye, Dolly...Hello, Synthia! J. Craig Venter Institute Seeks Monopoly Patents on the World’s First-Ever Human-Made Life Form,” 7 June 2007

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ETC News Release, “Global Coalition Sounds the Alarm on Synthetic Biology, Demands Oversight and Societal Debate,” and text of Civil Society Open Letter to Synthetic Biologists, 19 May 2006

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Endnotes

¹ John Carey, “On the Brink of Artificial Life, *Business Week*, 25 June 2007
http://www.businessweek.com/magazine/content/07_26/b4040047.htm

² Barrett Sheridan, “Making It Happen,” *Newsweek International*, 4 June 2007
<http://www.msnbc.msn.com/id/18882837/site/newsweek/>

³ Michael Kanellos, “Oil giant BP invests in microbe specialist,” CNET News.com 14 June 2007; Matt Marshall, “Synthetic Genomics searches for alternative fuels, valued at \$200M,” *VentureBeat*, 18 June 2007 <http://venturebeat.com/>

⁴ Hans Bügl *et al.*, “DNA synthesis and biological security,” *Nature Biotechnology*, Vol. 25, No. 6, June 2007, pp. 627-629.